(a) contacting the nucleic acid with a substrate having oligonucleotides attached thereto, the oligonucleotides having a sequence complementary to a first portion of the sequence of said nucleic acid, the contacting taking place under conditions effective to allow hybridization of the oligonucleotides on the substrate with said nucleic acid;

(b) contacting said nucleic acid bound to the substrate with a first type of nanoparticles according to any one of Claims 253-263 having one or more types of recognition oligonucleotides attached thereto, at least one of the types of recognition oligonucleotides comprising a sequence complementary to a second portion of the sequence of said nucleic acid, the contacting taking place under conditions effective to allow hybridization of the recognition oligonucleotides on the nanoparticles with said nucleic acid; and

(c) observing a detectable change.

385. The method of Claim 384 further comprising:

(d) contacting the first type of nanoparticles bound to the substrate with a second type of nanoparticles according to any one of Claims 253-263having recognition oligonucleotides attached thereto, at least one of the types of recognition oligonucleotides on the second type of nanoparticles comprising a sequence complementary to the sequence of one of the types of oligonucleotides on the first type of nanoparticles, the contacting taking place under conditions effective to allow hybridization of the oligonucleotides on the first and second types of nanoparticles; and

(e) observing the detectable change.

386. The method of Claim 385 wherein at least one of the types of recognition oligonucleotides on the first type of nanoparticles comprises a sequence complementary to the sequence of at least one of the types of oligonucleotides on the second type of nanoparticles and the method further comprises:

(f) contacting the second type of nanoparticles bound to the substrate with the first type of nanoparticles, the contacting taking place under conditions effective to allow hybridization of the oligonucleotides on the first and second types of nanoparticles; and

(g) observing the detectable change.

387. The method of Claim 386 wherein step (d) or steps (d) and (f) are repeated one or more times and the detectable change is observed.

388. The method of Claim 384 further comprising:

(d) providing a type of binding oligonucleotides having a sequence comprising at least two portions, the first portion being complementary to at least one of the types of oligonucleotides on the first type of nanoparticles;

(e) contacting the binding oligonucleotides with the first type of nanoparticles bound to the substrate, the contacting taking place under conditions effective to allow hybridization of the binding oligonucleotides with the oligonucleotides on the first type of nanoparticles;

(f) providing a second type of nanoparticles according to any one of Claims 253-263having recognition oligonucleotides attached thereto, at least one of the types of recognition oligonucleotides on the second type of nanoparticles comprising a sequence complementary to the second portion of the sequence of the binding oligonucleotides;

(g) contacting the binding oligonucleotides bound to the substrate with the second type of nanoparticles, the contacting taking place under conditions effective to allow hybridization of the oligonucleotides on the second type of nanoparticles with the binding oligonucleotides; and

(h) observing the detectable change.

389. The method of Claim 388 further comprising:

(i) contacting the second type of nanoparticles bound to the substrate with the binding oligonucleotides, the contacting taking place under conditions effective to allow hybridization of the binding oligonucleotides with the oligonucleotides on the second type of nanoparticles;

(j) contacting the binding oligonucleotides bound to the substrate with the first type of nanoparticles, the contacting taking place under conditions effective to allow hybridization of the oligonucleotides on the first type of nanoparticles with the binding oligonucleotides; and

(k) observing the detectable change.

390. The method of Claim 389 wherein steps (e) and (g) or steps (e), (g), (i) and (j) are repeated one or more times, and the detectable change is observed.

391. The method of Claim 384 wherein the substrate is a transparent substrate or an opaque white substrate.

392. The method of Claim 391 wherein the detectable change is the formation of dark areas on the substrate.

393. The method of Claim 384 wherein the nanoparticles are metal nanoparticles or semiconductor nanoparticles.

394. The method of Claim 393 wherein the nanoparticles are made of gold or silver.

395. The method of Claim 384 wherein the substrate has a plurality of types of oligonucleotides attached to it in an array to allow for the detection of multiple portions of a single nucleic acid, the detection of multiple different nucleic acids, or both.